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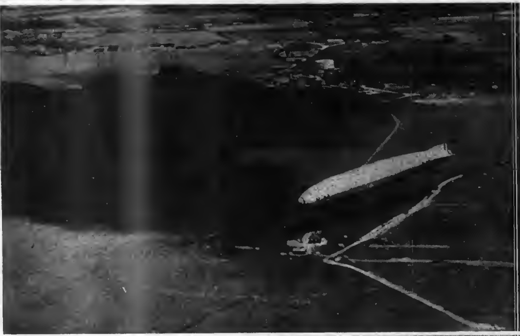

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Number 2

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AVIATION AND AIRCRAFT JOURNAL

July 11, 1921 VOL. XI. NO. 2

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AVIATION AND AIRCRAFT JOURNAL

LADISLAS D'ORCY, EDITOR
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EDWARD P. WARNER
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Vol. XI JULY 11, 1921 No. 2

Ratify the Air Navigation Convention

OF the civilized powers of the world today the United States stands substantially alone outside the agreement which governs international air travel throughout the world. The International Air Navigation Convention drafted at Versailles and since ratified by about forty independent and sovereign states lays down in detail the rules under which international air travel can be carried on. It provides for the licensing of aircraft, for the inspection and certification as regards structural strength and safety, for the licensing of personnel, and for the standardization of warning signals and meteorological information. Most significant of all, it provides that every ratifying state except some few of the European neutrals who adopted a proctocol drawn up for their benefit undertakes to prohibit the passage over its territory of the aircraft of non-ratifying states. The United States then stands today with Germany, Austria, Bulgaria, Turkey, and Russia as an aerial outlaw, unable legally to communicate directly with any of the allied nations.

Something of the difficulty which arises from this we have already seen in the hindrance to the traffic between this country and Canada, and we shall see more as long as the Air Navigation Convention remains unratified, for it is now a document fully established in practice and it has given rise to and furthered a working scheme of air travel which could hardly exist without it.

Designers as Pilots

THERE has long been dispute among aeronautical engineers as to the wisdom of combining engineering work with practical piloting. A certain number of designers have always held that they can do their work most effectively by staying out of the air and trusting to the reports of professional test pilots. Their major ground for this belief is that the average designer cannot hope to become a crack pilot and that it is better for him to depend on the report of a good test flier rather than spend his time in becoming a mediocre pilot of training machines, a phase of his education which might result merely in his becoming bigoted without adding anything useful to his technical knowledge.

Another school, however, and probably the larger one, at least in European countries, holds that no engineer can reach his full effectiveness unless he is able to carry through all the work connected with the airplane from start to finish and that no designer can get the pilot's viewpoint or can design an airplane to suit the pilot, which must in every case be the final aim, if he depends solely on the statement of others and never gets into the air himself. Certainly a little flying experience will give an engineer a much clearer idea of what stability and control mean and what is to be sought for in those respects, as well as of the proper lay-out of an airplane for the pilot's convenience, than can years of study on the ground.

Furthermore, it is universally recognized and constantly lamented that really good test pilots are so rare that there are never anywhere near enough to satisfy the demand. Men like Major Schroeder and Harry Hawker of the Sopwith Co., to mention only two among the more conspicuous names, are few and far between. While there is an almost unlimited number of men who can fly with great skill and who can perform any desired evolution, not one out of twenty of those men can tell clearly on returning to the ground what has happened during the flight or give a description of the behavior of the machine which will really guide its designer in seeking to improve it.

The number of examples of designers who are also crack pilots is impressive, as is the high average rank of such men among engineers. Those who have been acquainted with the Fokker airplane since its inception credit its remarkable qualities largely to the great skill as a pilot of Anthony Fokker, who is said to be one of the most skillful fliers in the world in every sense and on every type of airplane. Other engineers who fly continually at the present time are Captain Barnwell of the Bristol firm, and Captain De Haviland, as well as all of the officers in the Engineering Division of our own Air Service, to say nothing of pioneers such as Wright, Curtiss, Martin, Sopwith, Farman, and Roe, who began as self-taught pilots but who have since given up active flying.

Parachute Jumping

WE are a nation fascinated by the spectacular. It matters little in what form the spectacular appears as long as it is such.

As far as things aeronautical are concerned one of the latest spectacular feats attracting the attention of the public is the high altitude parachute jump. Emulation to outdo one another leads parachute jumpers to "step over" from ever higher altitudes. In the pursuit of the so-called world's records we are thus losing sight of fundamentals.

The fundamental requirement of the parachute is that it shall open. The next requirement is that it shall open quickly, and thus enable its wearer to jump from low altitudes.

However paradoxical it may sound, it is more important that a parachute be usable at 300 ft. altitude than at 30,000 ft., because at the low altitude the airplane may be hopelessly out of control while at the high altitude there is plenty of time and space to maneuver in. High altitude parachute jumps are very spectacular, but the low altitude jump is a far more convincing demonstration of the equipment's worth under conditions such as may occur in an emergency.

Those responsible for the development of the parachute should realize that high altitude jumps give the public an impression of the great hazard involved in that act rather than of its practical utility in case of danger.

Induction Systems *

By T. L. Sherman, B. E.

The very rapid development of the aerial arm of the fighting services during the war brought about a continued demand for increase of engine performance and output. Maximum efficiency and reliability were sought after regardless of expense or expenditure of human energy. As the carburetor and its attendant induction system are largely responsible for the volumetric efficiency, brake mean effective pressure, and fuel consumption, they received a proportionally just amount of attention from the experimental point of view.

It is not proposed, however, to discuss the design of carburetors themselves, but rather to examine the positioning or method of mounting, and the carburetor will be regarded simply as a unit mounted upon the induction system. The references and criticisms are intended to be of a general nature only, and, unless strikingly peculiar, no attempt will be made to consider details.

Induction Piping and Carburetors

All orthodox carbureting systems consist of a float-controlled series of jets situated in a comparatively short choke tube which has a more or less direct connection with the inlet ports of the cylinders by the induction pipe. Any additional vessels having a comparatively larger volume than the induction pipes themselves, and which may be introduced in series with the latter, will be referred to as an induction chamber. Must frequently the final connections to the inlet ports of all or certain groups of cylinders are included in a single cast or welded unit, which is generally called the induction manifold. Fig. 1 shows in diagrammatic form the disposition of the parts referred to and is intended to supplement the definitions given above.

It is well known that for any definite engine speed there is an equally definite length of induction pipe of arbitrary cross section area which will give maximum power. This statement applies, of course, to one particular cylinder unit of fixed bore and stroke, and does not necessarily follow with another cylinder of the same bore but having a different stroke. Furthermore, the experimentally found length will be effected by the disposition of valves and the timing selected. For any other engine speed a different length would be required. It will be appreciated, therefore, that it is impracticable for a fixed length of pipe to give maximum results over a wide range of speed, and when two or more cylinders are fed from the same induction pipe the problem becomes more complicated. The designer, therefore, usually adopts as short and as direct a connection to each cylinder as possible, thus reducing condensation to a minimum.

The timing of the engine is so arranged that interference between cylinders is reduced as far as possible. The cross sectional area of the induction pipe should be such that the velocity of the mixture is sufficiently high to prevent deposition and condensation without involving too large a friction head. The writer is of opinion that the allowable velocity lies within a fairly wide range, as conditions vary so considerably in different designs. Test results would indicate that values between 120 ft. and 200 ft. per minute are satisfactory. There have been cases in which speeds as high as 250 ft. per minute have been used with good results.

So complex and variable are the conditions that it is difficult to carry out comparative analyses with any conscientious justification for the conclusions arrived at. For fixed and rotary radial engines, in which each cylinder is fed through an exposed pipe arranged in radial fashion and attached to a centralized induction chamber, higher gas speeds are required than are necessary in water-cooled V engines having short water-jacketed pipes. This does not apply to an induction chamber which forms part of the main body of the engine and is not mounted in an exposed position. In these long induction pipes a high gas speed is necessary on account of the friction head introduced, whereas with very short pipes the gas speed is unimportant and may be even lower than the minimum figure quoted above. The most important factors to be considered in any multi-cylinder engine are absence of mutual interference and freedom from deposition and condensation.

The conditions under which aero engines operate require also maximum acceleration and flexibility over a wide range of speed, and, although these are fundamentally dependent upon characteristics of the carburetor itself, the induction piping plays an important part. Short lengths are free from movements of comparatively large volumes of mixture and so enable the cylinders to take instantaneous advantage

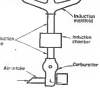


Fig 1

of the opening of the throttle. The writer considers that the b m e p of an engine is a direct measure of correctness of induction pipe layout; the carburetor and induction pipe are equally responsible for flexibility. Fuel consumption is, in the majority of engines, a function of carburetor design, as also is the variation of fuel consumption with altitude.

For the purpose of comparing the various induction pipe layouts in use, engines will be divided according to form into the following groups:

1. Six-cylinder-in-line engines.
2. Eight-cylinder 90 deg. V engines.
3. Twelve-cylinder V engines.
4. Fixed radial engines.
5. Rotary radial engines.

Six-Cylinder Vertical Engines

Figs. 2, 3, and 4 may be considered as indicative of the diversity of opinion of designers as to the arrangement of induction piping for a six-cylinder engine. The comparative test figures given in Table I are quite in accordance with what might have been foreseen.

It would appear that the use of parallel feeders from a single carburetor to a manifold is not good, in that there is a tendency to cause disturbance at the point where the two

TABLE I TEST FIGURES OF SIX-CYLINDER ENGINES

Engine	Compression Ratio	Bore and Stroke	Piston Speed	B M.E.P	Fuel Consumption per B H.P Hour
		in	ft. per min	lb per sq in	lb
Puma	4 92	5 71 7 48	1,745	128	.5
260 Maybach	5 92	6 3 7 09	1,854	117 7	.472
A12 Fiat	4 81	6 2 7 088	1 830	104 2	.54
230 Benz	4 92	5 71 7 48	1,742	116	.52
260 Mercedes	4 84	6 3 7 08	1,858	107 4	.544

* From The Automobile Engineer

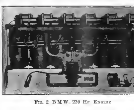


Fig. 2 B M W 230 Hp Engine

feeders meet. If at this point there be introduced a chamber of moderate capacity, the results should be improved considerably. The writer puts forward the manifold outlined in Fig. 5 as superior to any of the arrangements previously indicated. Each cylinder should be fed by direct pipes as long as can be arranged conveniently, so that the inlet ports are isolated as much as possible. Sharp bends are, of course, to be avoided.

V Type Engines

With eight-cylinder V engines, it is convenient to mount the carburetor in the form of a twin unit between the two sets of cylinders on account of the space available for a simple layout (see Fig. 6). Test figures on several engines of this type are given in Table II.

The twelve-cylinder engine presents much more scope for induction pipe design. The natural angle for an engine made up of two sets of six cylinders is 60 deg., which provides scarcely sufficient space for the really satisfactory installation of carburetors and air intakes (see Fig. 7), and this becomes proportionately smaller as cylinder bores increase. From the induction standpoint the best method is to mount the carburetors on the outside of the V.

With engines intended for use in single-engined machines, it will be appreciated that it is very troublesome and unsatisfactory to lead the exhaust pipes from the inside of the V to the side of the fuselage. In multi-engined machines there

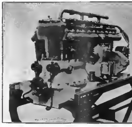


Fig. 3 Fiat Airship Engine

is normally no real objection, and the inside exhaust pipe is perhaps the better arrangement.

In order to reduce the cross sectional areas presented by the engine, the natural V angle is sometimes departed from, which further restricts the space available. Even when permissible, the fitting of inside exhaust pipes to such narrow engines is a debatable point on account of troubles caused by the hot exhaust pipes in close proximity to valve springs, etc., and the difficulties of cooling adequately when cowled in.

It would appear that the only practicable way to fulfill all the required conditions is to provide a space between the two central cylinders of each block and lead the induction pipes from each set of three cylinders through these spaces to carburetors mounted outside.

TABLE II TEST FIGURES OF EIGHT CYLINDER 90° V ENGINES

Engine	Compression Ratio	Bore and Stroke	Piston Speed	B M E.P	Fuel Consumption per B H P Hour
		in	ft. per min	lb. per sq in	lb
Viper	5 3	4 72 5 12	1 707	112	486
Arab	5.3	4 72 5 12	1 708	121	52
80 Renault	4 18	4 16 5 12	1,533	81 7	66

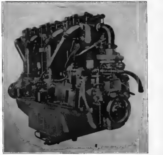


Fig. 4. Benz 230 Hp Engine

TABLE III TEST FIGURES OF TWELVE CYLINDER V ENGINES

Engine	Compression Ratio.	Bore and Stroke	Piston Speed	B.M.E.P	Fuel Consumption per B H.P Hour
		in.	ft. per min	lb. per sq in	lb.
Atlantic	4 9	3 71 7 48	1 872	111.3	.53
Eagle VIII	5 3	4 5 5.5	1 950	127.3	.5
Maori	5.2	3 94 5 91	1 858	127 7	.53
220 Renault	5 3	4 8 5 90	1 804	112	.5
Liberty 12	5.3	5 7	1 625	118	477
Condor	5.1	5 3 7 5	2 187	105	495
Lion	5 55	5.5 5 125	1 738	123	495

Arrow Type Engines

Engines having blocks or sets of cylinders arranged in fan-shape or arrow form give even more scope for variety of layout. Only one such engine has, however, reached a sufficiently advanced stage to be referred to in these notes. The scheme selected by the designer is indicated in Fig. 5, and, judged by the performance of this engine, the layout may be regarded as satisfactory. The cylinder block and crankshaft design have enabled a very short engine to be built. A single

carburetor feeds one induction pipe, a duplex feeding the other two cylinder blocks.

Radial Type Engines

Radial engines having rotating cylinders are almost always provided with a mechanically-operated jet carburetor (Tampier), which feeds a concentric induction chamber through the fixed hollow crankshaft, and from this chamber each cylinder is fed with a separate radial pipe. Fig 8 indicates the well known Le Rhone design.

In the Clerget engine the pipes are flattened in the direction of rotation in order to reduce air resistance, and in the Bentley Rotary 1 they are so arranged as to be shielded by the cylinders for the same reason. In the 200 hp Clerget the crankcase itself is used as an induction chamber, and the pipes are situated in front of the engine To what extent induction is affected by fluctuations of crankcase pressure it is difficult to say The performance given in Table IV is much below standard.

Among the static radial engines the A.B.C. "Dragonfly" uses a hexagonal layout instead of the usual centralized induction chamber.

Fig 5

Such a system provides considerable surface for exposure, and suffers from condensation troubles, and it is a well known fact that in a fixed radial engine there is a distinct tendency for the lower cylinders to obtain a rich mixture at the expense of the upper, which suffers from burnt-out exhaust valves, and any condensation which takes place aggravates these conditions. The use of two carburetors for nine cylinders does not appear to be sound The Bristol "Jupiter" engine (Fig. 9) has a central induction chamber, formed with three separate spiral passages, each feeding three cylinders, and each passage having its own carburetor. The scheme is good and much credit is due to its originator.

TABLE IV TEST FIGURES OF ROTARY ENGINES

Engine.	Compression Ratio.	Bore and Stroke	Piston Speed.	B.M.E.P	Fuel Consumption per B H P Hour
		in	ft. per min.	lb per sq in	lb
130 Clerget	4.36	4.72 6.3	1,312	85 4	583
Bentley R 1	6.26	5.51 7 09	1,886	92	63
200 Clerget	5 1	4 72 7 48	1 620	82 8	72

TABLE V TEST FIGURES OF FIXED RADIAL ENGINES

Engine	Compression Ratio.	Bore and Stroke	Piston Speed.	B.M.E.P	Fuel Consumption per B H P Hour
		in.	ft. per min	lb. per sq in	lb
Dragonfly	4 42	5 2 6.6	1787 3	100	6

Heating the Induction Piping

On account of the low temperature of the inlet air met with at altitudes and the further cooling which takes place on evaporation, it is found necessary to furnish a supply of heat to the induction piping at these points where condensation or deposition is likely to take place. In water-cooled engines advantage is taken of the temperature of the outlet cooling water, which is led to jackets surrounding the induction pipe at points where the direction of flow of the gases is changed, some of the gasoline carried forward in suspension being deposited on each bends. The manifold itself, however, although requiring abrupt alterations in the direction of flow of the mixture, is generally found to obtain sufficient heat by conduction from the cylinder heads.

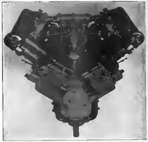


Fig 6. Hispano-Suiza 150 Hp. Engine

The heating of the induction pipe is only carried out to prevent deposition and condensation as far as possible, and the temperature of the mixture should not be unduly raised.

In a rotary engine the induction chamber assumes a temperature approximate to that of the engine crank case, and no direct attempt is made to meet the severe exposure of each radial pipe. In the B.R.2 engine, however, the heated air from the cylinder flows over the pipe, but to what extent this is really effective is not definite. As far as performance is concerned, it presents little improvement over the 130 hp Clerget, which has induction pipes in a more exposed position, though comparatively close to the cylinder itself It is clear, however, that the small amount of heat which does reach these pipes is advantageous. The poor results of the 200 hp Clerget may be attributed in large measure to the frontal position adopted for the induction piping

Exhaust leads should, of course, be as direct as possible to the atmosphere. The air intake to the carburetor has generally been looked upon as part of the airplane itself on account of the fact that its shape and dimensions are frequently bound up with the mounting of the engine in the machine Carburetors on the outside of an engine are usually easily dealt with—infact, there are many cases in which no extra length of piping is required, but when placed in the V there is frequently great difficulty in providing a satisfactory arrangement.

Fig. 7. Fiat 650 Hp. Engine

Mounting of Carburetors

A matter requiring very careful consideration is the mounting of the carburetor itself particularly with regard to controls. When two or more carburetors are used it is clear that the throttle positions should be synchronized as closely as possible. For many reasons the layout of interconnected controls should be straightforward and accessible, with good provision for definite and easy adjustment. The housings for fulcrum pins and rods should not be left to the discretion of the airplane assembler, but should be provided as an integral part of the engine, with the necessary lugs and bosses cast integral with the crank case or other engine part, and the carburetors should be directly mounted on the engine.

One of the reasons which have militated against the ideal mounting of carburetors is the use of standardized units, which by no means invariably lend themselves to neat and accessible mounting The fact that several leading firms have designed and used special carburetor bodies using standard jets, floats, etc, is significant, and further progress in this direction may be anticipated. A further point on which attention might be concentrated is the more thorough atomization of the fuel The vast majority of carburetors in use at the present time consist mainly of a jet whose center line is co-axial with that of the choke tube, and any atomization which takes place is due largely to water jacketed bends, but by far the greatest proportion of the fuel is vaporized inside the combustion chamber

Slight warming of the incoming air only should be sufficient for all purposes, and this, in addition to more thorough atomization, should go a long way toward improving distribution, with consequent economy, and the deletion of water-jacketed portions of the induction system will be welcomed

Carburetors in which the gasoline issues from the jet at right angles or at 180 deg to the incoming air have been constructed with varying degrees of success, and it is hoped that further development in this direction will take place, especially in view of the ever-increasing specific gravity of the fuels obtainable.

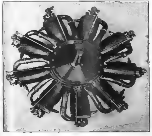


Fig. 8. Le Rhone 80 Hp. Engine

Fig. 9 Bristol "Jupiter" 450 Hp. Engine

The Navy and the Air

In connection with the bombing tests of various warships by Army and Navy air forces it is interesting to hear an appreciation of air forces by "Quarterdeck", a distinguished naval writer who contributes to *The New York Tribune* Discussing the question as to what constitutes a strong navy, this writer expresses the view that battleships, however, strong their armament and powerful their protection be, are weak if they are not supplemented by certain forces that are essential to naval strength

"What is a strong navy today?" Quarterdeck asks. "Bigness alone is not strength A jellyfish is big, but it lacks the aggressiveness and striking power of a little crab A whale is big, but it may be killed by the combined attack of a little swordfish and a little thrasher"

Continuing, he points out that while at the outbreak of the World War submarines and air forces were more or less ignored as naval assets, today the situation is totally changed, for both weapons have proved their great value in actual warfare. Speaking of naval aircraft, he says

"A naval air force to serve at sea with the fleet is an absolutely necessary element of a strong navy It is immaterial whether or not bombing and torpedo planes can actually sink a $40,000,000 dreadnought. It will be admitted that they menace the capital ship. They can and they will sink all other surface craft! Enough has been done to prove that destroyers, cruisers, colliers and auxiliary ships in the fleet can be bombed off the sea if the enemy commands the air! Small bombs will suffice against such vessels. They have no armor protection Their upper decks are thin and easily penetrated. One 250-lb. bomb penetrating the machinery or boiler compartment of a destroyer or cruiser will put it out of action.

"There have no doubt been many over-statements as to the power of the bombing plane and the percentage of hits it may make. But it is nevertheless clear that battleships and surface craft generally will be constantly endangered The dreadnaught cannot scoff at a 1,000-lb bomb landing on its deck. It may not be sunk, but it will be badly jarred. It is possible that it may be put out of action, floating harmlessly upon the sea. The surface fleet must not lose control of the air If it does it cannot longer exist."

Position Finding by Wireless

(The following note on the determination of the position of aircraft by radio compass bearings appears in Notice to Aviators No 6, 1921. The note was communicated by Lieut Comdr F P Conger, U S N., of the Naval Communication Service — EDITOR.)

The value of utilizing the great number of radio stations in operation on the Atlantic, Gulf and Pacific coasts of the United States for purposes of position finding by aircraft flying along or near the coast line is not generally understood by the majority of aviators. The following radio compass stations are now in operation:

ATLANTIC AND GULF COASTS

Radio compass station	Radio call	Latitude (N) °	′	″	Longitude (W) °	′	″
Bar Harbor, Me	NRD	44	18	36	68	11	27
Cape Elizabeth, Me	NAB	43	33	58	70	11	58
Gloucester Mass	NAD	42	38	13	70	41	08
Deer Island Mass.	NAD	42	21	15	70	57	20
Fourth Cliff Mass.	NAD	42	08	40	70	42	22
Cape Cod, Mass.	NAE	42	02	23	70	03	37
Chatham Mass	NXA	41	42	49	69	57	53
Surfside Nantucket, Mass.	NBR	41	14	42	70	05	58
Prices Neck R I	NAF	41	27	08	71	20	15
Montauk L I	NAH	41	03	09	71	57	27
Fire Island, N Y	NAH	40	38	37	73	12	32
Sandy Hook, N J	NAH	40	28	12	74	01	06
Mantoloking, N J	NAH	40	01	30	74	03	10
Cape May N J	NSD	38	38	00	74	54	34
Bethany Beach, Del	NSD	38	32	42	75	03	21
Hog Island, Va	NCZ	37	22	38	75	43	37
Virginia Beach, Va	NCZ	36	51	09	75	58	24
Cape Hatteras N C	NDW	35	14	22	75	31	43
Cape Lookout, N C	NAN	34	36	18	76	32	15
North Island, S. C	NEW	33	13	21	79	11	08
Morris Island, S. C	NAO	32	41	48	79	22	17
Pass a Loutre La	NBX	29	11	24	89	02	22
Burwood, La.	NBX	28	57	27	89	23	16
Grand Isle, La.	NL1	29	13	32	89	58	43

PACIFIC COAST

Radio compass station	Radio call	Latitude (N) °	′	″	Longitude (W) °	′	″
Westport, Wash.	NHL	46	53	10	124	07	23
Eureka Calif	NPW	40	41	47	124	18	26
Point Reyes Calif	NLG	38	02	30	122	59	28
Bird Island, Calif	NLD	37	48	25	122	32	11
Point Montara, Calif	NLM	37	32	10	122	31	00
Farallon Island Calif	NP1	37	41	35	123	00	03
Point Arguello Calif	NPK	34	34	42	120	68	33
Point Hueneme Calif	NMD	34	08	40	119	12	30
Point Fermin, Calif	NPX	33	42	18	118	17	37
Point Loma, Calif	NPL	32	42	30	117	13	27
Imperial Beach, Calif	NPL	32	35	14	117	07	35

All aircraft equipped with radio apparatus which can be tuned to 800 meters (or 600 meters in case of emergency) can make use of the above stations to determine their position or direction of flight in thick weather or conditions of low visibility. The procedure for obtaining compass bearings is as follows:

The compass station should be called in the usual manner, using the 800-meter wave length (or 600 meter in case of emergency); the call to be followed by the signal 'QTE', meaning, What is my true bearing? When told by the compass station 'K' (go ahead), the aircraft operator should follow the procedure outlined below

(a) Transmit the planes radio call for 30 sec.

(b) Make dashes, each five seconds long, for one minute with the planes radio call after each dash.

(c) Terminate with the signal 'K'.

If satisfactory bearings are obtained, the operator at the compass station will call the plane in the usual manner and reply 'QTE', followed by the true bearing in degrees (0 to 359) spelled out in words, and the name of the radio compass station from which the bearing was obtained, otherwise a repetition of the test will be requested. The aircraft operator should acknowledge receipt of the bearings by answering the compass station in the usual manner, and repeat in numerals the bearings received. This procedure enables all stations concerned to check the bearings.

When a single bearing is furnished, there is a possibility of an error of approximately 180 deg., as the operator at the compass station can not always determine on which side of his station the air craft lies. Certain radio compass stations, particularly those on islands or extended capes, are equipped to furnish two corrected true bearings for any observation. Such bearings, when furnished aircraft, may differ considerably from 180 deg. from each other, and whichever bearing is suitable should be used. Pilots should, therefore, never attempt to correct a bearing furnished by a radio compass station, by the application of the 180 deg correction, as such correction does not take into account the deviation at the compass station which may be of different sign and unequal amount in opposite directions. The error introduced by the use of a 180 deg correction may amount to as much as 30 deg. Aircraft receiving bearings requiring approximately 180 deg. correction, should request the reciprocal bearings from the radio compass station, in case the same is not furnished."

There are difficulties encountered at compass stations in obtaining very accurate bearings of aircraft in flight, due to the following conditions

1 The high speed of planes and their customary proximity to the shore line, which results in a rapid change of bearings.

2 The compass stations of a group will not observe bearings at the same moment of the test and it is possible for two or even three minutes to elapse between the times of observation by two stations in a group, during which period the bearing of a plane will change from 10 deg to 100 deg. Another minute or two will elapse before the control station will forward position or bearings to the aircraft concerned

3 Single bearings can be furnished fairly accurately. The difficulty exists in obtaining cross bearings, or a fix.

4 Bearings and resultant positions are incorrect when the aircraft is inshore, as the majority of the stations are calibrated over the arc to seaward only. The following procedure is recommended for trial, in order to determine its feasibility and degree of accuracy

Example

(a) Plane requests QTE (Bearings)

(b) Station tells plane to test.

(c) Plane tests—Call letter followed by 10-sec. dash

(d) Station forwards single bearing

(e) Plane tests—Call letter followed by 10-sec dash

(f) Station forwards single bearing

For (d) and (f) a group of two stations might with experienced observers be able to forward a fairly accurate position

The salient points for pilots to consider are that the closer the plane is to the compass station the less accurate the bearing becomes, due to the rapid change in bearing. If a pilot's position is unknown to himself, a single bearing from a station will provide a leading course to the station.

To overcome some of these difficulties, an excellent method is for the aircraft, when practicable, to fly in circles when endeavoring to obtain a single bearing or a fix from two or more stations. This relatively small change of position will insure more accurate results

To prove that direction finding by radio is both useful and practicable, Naval F-5-L planes have made flights, navigating entirely by the bearings furnished them from a vessel or station over 100 miles distant. The distance from which aircraft may receive bearings from shore radio compass stations depends on the power or range of the aircraft set, hence, the strength of the signals sent out from the aircraft. If the signals are strong enough to be clearly heard at the compass station, a bearing can be readily taken. If the signals are weak or the aircraft is out of range of its set, no bearings can be furnished. This condition may occur when an aircraft requests a bearing, receives an acknowledgement from the compass station, but while waiting for the signal to test, the plane, on account of its high speed, passes out of range of its own set, hence another reason for flying in circles.

Aeronautical Legislation

At a recent meeting of the Kokomo, Ind., city council there was passed an aircraft ordinance to regulate the minimum altitude at which airplanes may pass over the city

A police regulation which recently came into force at New Orleans provides for the arrest of aviators flying dangerously low over crowded areas.

Civil Aviation in Canada

Below is reproduced an interesting tabulation which has just been issued by the Air Board of Canada. It is a summary of civil aviation certificates and licenses issued, cancelled, renewed and still in force from Jan. 1, 1920 to May 31, 1921. These certificates and licenses are issued in accordance with the provisions of the International Air Navigation Convention, to which Canada is a signatory. The identity mark (nationality letters) of Canadian civil aircraft is G-C, which group is followed by three registration letters, thus G-CDYK.

A perusal of this tabulation brings out several interesting points. First, the number of civil (private and commercial) pilot's licenses which have been suspended. It would be informative from the viewpoint of what a civil pilot should not do for the sake of safety to learn the reasons for these suspensions. Secondly, the machines "written off" by the Board of Survey, which does not appear in this table, but is mentioned in a supplementary statement dealing with certificates of registration of aircraft. The particular types of machine written off matters little, and in this case even less, for the excellent qualities of the Avro and SE-5 are well known. The significant thing in this connection is that converted war machines were found unsuitable for a special type of civil aviation. Thirdly, the large number, 125, of licensed air engineers (ground engineers) available in Canada at the present time.

The whole statement speaks of safety, and shows that Canada is building a firm foundation for her civil aviation of the future.

SUMMARY OF CANADIAN CIVIL AVIATION CERTIFICATES AND LICENSES ISSUED CANCELLED, RENEWED AND STILL IN FORCE FOR PERIODS AS SHOWN. SUMMARY ISSUED MAY 31, 1921

TYPE OF CERTIFICATE OR LICENSE	1920 Certs and Licenses: Applications	Refused	New Issues	Lapsed Suspended or Cancelled	Renewals or Reinstatements	In Force on Dec 31, 1920	† 1921—Jan 1 to May 31 Certificates and Licenses: Applications	Refused	Carried Over in Force From 1920	New 1921 Issues	Lapsed Suspended or Cancelled	Renewals or Reinstatements	1921 Issues in Force on May 31 1921	Total in Force on May 31, 1921
Private Air Pilots	nil		33	nil	nil	33	nil		33	6	3	3	8	66
Commercial Air Pilots	1		33	11	22	83	nil		83	33	25	12	26	92
Air Engineer's	3		87	4	nil	83	nil		83	33	13	nil	33	125
Air Navigator's	nil		nil	nil	nil	nil	nil		nil	1	nil	nil	1	1
Airship Officer Pilots	nil			"		"	"		"	nil	"	"	nil	nil
Registration of Aircraft														
Civil Aviation M/cs	1		71	13	nil	81	nil		81	4	8	nil	4	87
Civil Government M/cs	nil		13	nil	nil	13	nil		13	11	nil	nil	11	24
Can Air Force M/cs	nil		45	1	nil	45	nil		45	23	9	nil	13	58
Airharbor Licenses														
Civil Aviat'n Airh'brs	3		32	1	nil	31	nil		31	3	12	nil	3	22
Civil Gov't "	nil		5	nil	nil	5	nil		3	2	nil	nil	2	7
Can Air Force "	nil		1	nil	nil	1	nil		1	nil	nil	nil	nil	1
TOTALS —	10		408	27	23	373	nil		373	134	70	21	110	448

* Figures include all certificated Air Board employees † Cumulative up to December 31st of each year

THE LIBERTY-ENGINED DAVIS-DOUGLAS CLOUDSTER ON WHICH DAVID R. DAVIS AND ERIC SPRINGER ATTEMPTED TO CROSS THE UNITED STATES IN A NON-STOP FLIGHT

Photo International

"Who's Who in American Aeronautics"

(Copyright, 1921, by The Gardner, Moffat Co., Inc.)

Every week, AVIATION AND AIRCRAFT JOURNAL prints the biographical sketch of men who are prominent in American Aeronautics. These sketches will be published later in pamphlet form. As so many of the officers change their stations often, it is believed that a semi-annual issue will be necessary. In compilations of this character many errors and omissions occur. It will be appreciated if corrections are sent to "Who's Who" Editor.

Harry Depew Copeland

COPELAND, HARRY DEPEW, Commercial Aviator; born, Cambridge, Mass., April 17, 1890; son of Harry D. Copeland and Grace (Shaw) Copeland.

Educated: Public schools, Detroit, Mich. Rindge Technical School, Cambridge, Mass. University of Toronto School of Military Aeronautics.

Professional: Photography, 1914-1917.

Aeronautical Activities: Flew glider at Franklin Field, Boston, 1909; assisted in building and flew Curtiss type biplane, Detroit, 1911; built and flew own biplane, 1913; enlisted Royal Flying Corps, 1917; training in Canada, commissioned 2nd Lieut., 1917, and posted to Taliaferro Field as flying instructor in School of Aerial Gunnery; promoted to 1st Lieut., April 1918, and posted Flight Commander School of Aerial Fighting, Beamsville, Ontario; became chief pilot, Universal Aviation Co., July 1918; Dec. 1919, flew from Buffalo to St. Louis; spring of 1920, visited aviation centers of England, Belgium, Holland and Germany; Dec. 1920 Jan. 1921, flew in Florida.

Flying Rating: F.A.I. Pilot Certificate, Dec. 1917; British Military (R.F.C.) 1917; British Civilian Certificate No. 86, 1919; State of Conn. License No. 11, 1920.

War Service: Radio Officer, British blockade runners, 1915-1916; flying officer, R.F.C. and R.A.F., 1917-1919.

Member: Institute of Radio Engineers; Aero Club of America; Aero Club of Hartford; American Legion.

Present Occupation: Commercial flying.

Address: 12 Howland St., Cambridge 39, Mass.

Lewis Hyde Brereton

BRERETON, LEWIS HYDE, Lieut. Colonel Air Service; born, Allegheny, Pa., June 21, 1890; son of William Henry Brereton and Helen (Hyde) Brereton, married Helen Clason Willis, Feb. 27, 1913.

Educated: St. John's College at Annapolis, Md., 1911, U. S. Naval Academy.

Professional: Transferred to Army, Aug. 1911 and commissioned 2nd Lieut., Artillery; commissioned 1st Lieut., July 1, 1916; commissioned Captain and Major, Aug. 1917; commissioned Lt. Col. Oct. 28, 1918. Air Service, July 1912 to July 1914, and Dec. 1919 to date.

Flying Rating: Aero Club Pilot License, Aero Club Expert Aviator No. 13, 1913. Military Aviator, March 19, 1913. Junior Military Aviator, July 1, 1917; rated Military Aviator for distinguished service against enemy in action over the front, April 9, 1919.

War Service: Chief, Air Service, 1st Army Corps, Chateau Thierry and Aisne Offensives. Wing Commander, 1st Army, St. Mihiel and Argonne Offensives.

War Honors: Distinguished Service Cross, St. Mihiel, Sept. 12, 1918; Croix de Guerre with Palm, Chateau Thierry, July 1, 1918; Second Palm, July 17, 1918; Legion of Honor, July 17 and 18.

Member: Army and Navy Club, Aero Club of America, Cercle Interallie' (Paris).

Present Occupation: Air Attache, American Embassy, Paris.

Address: 9 rue de Chaillot; home, 9 rue de General Lambert, Paris, France.

Lawrence S. Churchill

CHURCHILL, LAWRENCE S., Major, Air Service; born, Ogdensburg, N. Y., June 19, 1890; son of John C. Churchill and Mary B. Churchill; married, Bessie Ann Moore, Jan. 17, 1920.

Educated: Public schools, Oswego, N. Y. Stanton Military Academy, 2 years Union College.

Professional: Army Officer.

Aeronautical Activities: Training at Aviation School, San Diego, Calif., General Staff College, A. E. F., 1918; C. O., Souther Field, Nov. 1919 to date.

Flying Rating: Junior Military Aviator, Airplane Pilot.

War Service: 1st Corps Observation Group, Corps Air Service Commander, 8th Army Corps. Commissioned Capt., May 1917; Major, July 1920.

Present Occupation: Commander, Americus Air Intermediate Depot.

Address: Americus, Ga.

Lawrence W. McIntosh

McINTOSH, LAWRENCE W., Major, Air Service; born, Ashburnham, Mass., Aug. 29, 1885; son of William E. McIntosh and Mabla S. McIntosh.

Educated: High school, U. S. Military Academy.

Professional: Detailed as Major Aviation Section, Signal Corps, 1917; promoted to Lt. Col. Aug. 1918; duty at Kelly Field, Oct. 1917 to March 1918; Commanding Officer, Selfridge Field; Armorers School, Wilbur Wright Field, 1918; Assistant Executive, Office Director of Air Service, 1919; Commanding Officer, Ellington Field, Selfridge Field, May to Nov. 1919; student, Air Service Engineering School, Nov. 1919 to Nov. 1920; Assistant to Chief, Engineering Division, McCook Field, Nov. 1920 to date.

Flying Rating: Junior Military Aviator, Airplane Pilot.

War Service: As above.

Member: Aero Club of Texas.

Present Occupation: Assistant to Chief, Engineering Division.

Address: McCook Field; home, 223 McDaniels Street, Dayton, Ohio.

Gorman DeFreest Larner

LARNER, GORMAN DE FREEST, Banking; born, Washington, D. C., July 5, 1897; son of Robert Martin Larner and Adelaide (De Freest) Larner.

Educated: Town School, Western High School, Lawrenceville Prep. School, A.B. 1921, Columbia University.

Aeronautical Activities: Lafayette Flying Corps, June 1917; training Avord, Tours, Pau, Plessis Bellerille; Pursuit Pilot, Corporal, Escadrille 86, Groupe de Combat 14, Dec. 1917; 1st Lieut., U. S. Air Service, April 1918; Flight Commander, 103rd Aero Squadron, May 1918; Captain, U. S. Air Service, Nov. 1918; Intelligence Officer, Peace Commission; Major, Reserve Corps, Feb. 1920.

Flying Rating: Reserve Military Aviator.

War Honors: Distinguished Service Cross with Bronze Oak Leaf; Croix de Guerre with two palms. American Ace officially credited with destruction of 8 German airplanes (3 with French army and 5 with A.E.F.).

Member: Aero Club of America, Army and Navy Club, Aero Club of Columbia University, D. K. E. Club, Chevy Chase Club.

Present Occupation: Bond Department, Guaranty Co. of New York.

Address: 140 Broadway, New York, N. Y.; home, The Highlands, Washington, D. C.

Paul Gerhard Zimmermann

ZIMMERMANN, PAUL GERHARD, Aeronautical Engineer; born, Iroquois, S. D., May 12, 1890; son of Charles Frederick Zimmermann and Amy (Boardman) Zimmermann; married Marguerite Wetzel, April 19, 1915.

Educated: Public schools, Sioux Falls, S. D.; San Juan High School; M. E. 1910, Rensselaer Polytechnic Institute, Troy, N. Y.

Professional: Knox Auto Co., 1913-1914; 1914 to 1919, Curtiss Aeroplane and Motor Co.; 1919 to present, Chief Engineer, Aeromarine Plane and Motor Co.

Aeronautical Activities: As above.

Member: Aero Club of America, University Club of Buffalo, Key Port Yacht Club.

Present Occupation: Engineer in Charge, Aeromarine Plane and Motor Co.

Address: 99 Cohoes St., Key Port, N. J.

Henry George Boonstra

BOONSTRA, HENRY GEORGE, Air Mail Pilot; born, Lafayette, Ind., Oct. 20, 1889.

Educated: Lafayette public schools and high school; B.S. 1912, Purdue University.

Professional: Salesman.

Aeronautical Activities: Instructor at Chanute Field, 1918; test pilot at repair depot speedway, Indianapolis, Ind., 1919; commercial flying and passenger carrying, 1920.

War Service: As above.

Present Occupation: Pilot, Air Mail Service.

Address: Air Mail Field, Maywood, Ill.; home, 91 South 26th Street, Lafayette, Ind.

Reed Ellsworth Davis

DAVIS, REED ELLSWORTH, Commercial Aviator; born, Humbolt, Neb., Aug. 29, 1899; son of A. V. Davis and B. J. Davis.

Educated: Public schools, Chillicothe Normal, Chillicothe, Mo.; Grand Island College, Grand Island, Nebr.

Professional: Teacher, commercial work and business administration, 1915-1919.

Aeronautical Activities: Signal Corps, Div. of Aeronautics, Ground School work at University of California; training at Mather Field; commercial flying since discharge from Army.

Flying Rating: Reserve Military Aviator.

War Service: Jan. 1919 to Jan. 1919.

Present Occupation: Sales Manager, North Platte Aircraft Co.

Address: Box 114, North Platte; home, North Loup, Nebr.

James Patrick Murray

MURRAY, JAMES PATRICK, Air Mail Pilot; born, Mystic, Conn., Nov. 28, 1892; son of Patrick F. Murray and Margaret (Donovan) Murray.

Educated: Norwich Academy, B.S. 1914, Trinity College.

Professional: Science, Mathematics and Athletic Instructor, Newman School, Hackensack, N. J.

Aeronautical Activities: Enlisted in R.F.C., June 1917; trained at Toronto, Camp Borden, Canada, Salisbury Plains, England; flying instructor, R.F.C., England, March 1918 to March 1919.

War Service: As above; joined 110th Squadron, R.A.F., April 1919; Army of Occupation, April 1919 to Sept. 1919, carrying mail from Folkstone, England to Cologne, Germany.

Present Occupation: Air Mail Pilot.

Address: 115 W. 19th Street, Cheyenne, Wyo.; home, 124 McKinley Ave., Norwich, Conn.

Gerald Goad

GOAD, GERALD, Commercial Aviator; born, Denver, Colo., June 3, 1903; son of Thomas W. Goad and Helen M. Goad.

Educated: Harrow House School, England; Kingham public school; Bellingham College, Wash.

Professional: British War Mission, New York, N. Y., 1915-1917; Inspector and Assistant Purchasing Agent, 1919-1921; President, American Aerial Corp.

Aeronautical Activities: 1917, Royal Flying Corp, Canada, training 1917-1919; R. F. C. and R.A.F. pilot, England and France, 73rd Squadron; civilian flying 1920-1921.

Flying Rating: Lieut., Scout Pilot, R.F.C. 1917.

War Service: 1917-1919, R.F.C. and R.A.F.

War Honors: One French Decoration.

Member: British Naval and Military Veterans.

Present Occupation: President, American Aerial Corp.

Address: 196 Federal Street, Boston, Mass.; home, Hingham, Mass.

Roy Stuart Brown

BROWN, ROY STUART, Major, Air Service; born, Minneapolis, Minn., Dec. 22, 1888; son of Seba Smith Brown and Anne Elizabeth (Anderson) Brown.

Educated: Madison Grammar School and Central High School, Minneapolis, Minn., 1908; U. S. Military Academy, 1 year University of Minnesota.

Professional: Enlisted in 15th U. S. Cavalry, March 1911, private, corporal and sergeant; commissioned 2nd Lieut., Cavalry, Nov. 29, 1912.

Aeronautical Activities: Flying training, San Diego, Calif., 1915; 1st Aero Squadron in Mexico 1916; examining board and school for pilots, 1917; experimental work, Sept. 1917 to Aug. 1918; commanding 2nd wing, Dec. 1918 to March 1919; Philippine Islands, Oct. 1919 to March 1921.

Flying Rating: Junior Military Aviator 1919, Military Aviator, 1919.

War Service: In charge of pilots school and experimental work during the war.

Present Occupation: Army Officer.

Address: Adjutant General of the Army, Manila, P. I.

Herman Theodore Kraft

KRAFT, HERMAN THEODORE, Aeronautical Engineer; born, Akron, Ohio, April 11, 1890; son of Theodore Kraft and Sophia (Mistermann) Kraft; married Frances Steiner, Feb. 2, 1919.

Educated: St. Bernards and Sacred Heart Academy.

Professional: With Kraft Knitting Co., 1905 to 1913; with Goodyear Tire & Rubber Co., June 1914 to date.

Aeronautical Activities: Test Pilot for Goodyear Tire & Rubber Co. on airships built for Army and Navy; proposed the Pony Blimp; Asst. Aero Engineer to Ralph Upson from May 1917 to Nov. 1920; Chief Aero Engineer for Goodyear Tire & Rubber Co., 1920 to date.

Flying Rating: Dirigible Pilot, Aero Club Certificate No. 97.

War Service: Civilian Engineer, U. S. Army, sent to France and England to study design of lighter-than aircraft, Oct. 1917 to March 1918.

Member: Treas. Akron Flying Club.

Present Occupation: Chief Aero Engineer, Goodyear Tire & Rubber Co.

Address: E. Market St.; home, 161 W. Buchtel Ave., Akron, Ohio.

Richard Stockton Jannopoulo

JANNOPOULO, RICHARD STOCKTON, Automobile Business; born, St. Louis, Mo., Oct. 23, 1895; son of John Christopher Jannopoulo and Beroolee (Stockton) Jannopoulo.

Educated: Public schools of St. Louis, Kirkwood Military Academy, Culver Military Academy, Culver Summer Naval School.

Professional: Secretary and Director of Wescott Automobile Co.

Aeronautical Activities: Trained with R.F.C. in England as Pilot, as Observer in Tours, France, as Artillery Instructor in Observation, as observer over the front with 91st Aero Squadron, 1st Army Observation Group.

Flying Rating: Observer, May 1918.

War Service: April 1917 to Feb. 1919; St. Mihiel and Argonne Offensives; Defensive Sector prior to St. Mihiel Drive. Officially credited with destruction of one enemy airplane.

Present Occupation: Automobile Business.

Address: 3227-3229 Locust St.; home, 4232 West Minister Place, St. Louis, Mo.

Walter Edwin Lees

LEES, WALTER EDWIN, Commercial Aviator; born, Janesville, Wis., July 19, 1887; son of Richard H. Lees and Frances L. Lees; married Lou C. Lloyd, May 1915.

Educated: Manitowoc, Wis. High School 1900-1904; Mech. Engr. 1908-1910, University of Wisconsin.

Aeronautical Activities: Flew flying boat for Illinois Naval Reserves May to Sept. 1915; instructed and tested land and water for Curtiss Aeroplane Co., Sept. 1915 to May 1917; entered Army May 1917 as Civilian Flying Instructor; transferred to McCook Field May 1918 as Test Pilot; Curtiss Aeroplane and Motor Corp., June 1919 to Oct. 1919; Oregon, Washington, and Idaho Airplane Co., Nov. 1919 to Sept. 1920; Russell Aviation Co., Spokane, Wash., Sept. to Feb. 1920; La Grande Aircraft Co., La Grande, Ore., Feb. 1921 to date.

Flying Rating: Pilot License, Aviator No. 960; Hydro No. 900; Expert No. 79.

War Service: Chief Flying Instructor (Civilian) May 1917 to May 1918; Test Pilot (Civilian) May to Dec. 1918.

Member: Aero Club of America.

Present Occupation: Commercial Aviation Manager, La Grande Aircraft Co.

Address: 115 Depot St., La Grande, Ore.; home, 54 West 97th St., New York, N. Y.

Joseph Taggart McNarney

McNARNEY, JOSEPH TAGGART, Captain, Air Service; born, Emporium, Pa., Aug. 28, 1893; son of James P. McNarney and Helen (Taggart) McNarney; married, Helen Wahrenberger, June 30, 1917.

Educated: Emporium public and high schools, 1915, U. S. Military Academy.

Professional: U. S. Army Officer, 21st Infantry 1915-1919; Aviation Section, Signal Corps and Air Service 1919 to date; Temporary Major and Lt. Col.

Aeronautical Activities: On continuous flying duty since Oct. 1919; served as pilot, 1st Aero Squadron, Columbus, N. M. and France; ordered to A.E.F., Aug. 1917; Flight Squadron and Group Commander, Corps Observation Group; Commander, Army Observation; Chief of Air Service, 3rd and 4th Corps; Commanding Officer, Camp Knox; Gerstner Field 1919-1920; Instructor, Field Officers School, Langley Field, Nov. 1920 to date.

Flying Rating: Junior Military Aviator, Airplane Pilot.

War Service: A.E.F. Aug. 1917 to June 1919.

Books: "Observation Air Service Manual."

Present Occupation: Instructor, Field Officers School, Langley Field.

Address: Langley Field, Va.; home, 101 West Fourth Street, Emporium, Pa.

Norman W. Peck

PECK, NORMAN W., Major, Air Service; born, Oshkosh, Wis., July 18, 1895; son of Herman W. Peck and Sophie (Dickman) Peck; married, Olive Anna Savage, July 17, 1917.

Educated: Public schools at Oshkosh, Wis., St. John's Military Academy, Delafield, Wis.

Aeronautical Activities: Detailed in Aviation Section, Signal Corps 1916; student at Signal Corps Aviation School, San Diego, Calif., 1916-1917; President, Board of Officers, selecting balloon and seaplane sites for coast defenses of the Gulf and Atlantic Coasts, 1918; constructed and commanded Emerson Field; commanded Air Service Troops at Camp Jackson, 1918; organized and commanded Pope Field; Engineering Officer, Ellington Field, 1919.

Member: Air Service Examining Board, Vancouver Barracks, 1920.

Flying Rating: Junior Military Aviator, June 1917; Spherical Balloon Pilot, Jan. 1921; Balloon Observer, March 1921; Airship Pilot, May 1921.

War Service: As above.

Present Occupation: Major, Air Service.

Address: Langley Field, Hampton, Va.; home, 821 Belleview Place, Milwaukee, Wis.

Henry E. Stickney

STICKNEY, HENRY E., Commercial Aviator; born, New York, N. Y., Jan. 9, 1899; son of Henry E. Stickney and Mary (Sullivan) Stickney; married D. M. Black, Sept. 24, 1920.

Educated: New York public schools, Vermont Academy.

Aeronautical Activities: Experimented on gliders 1912; civilian flying, 1917; commercial flying since close of war.

War Service: French Army 1917; American Army 1918, 1st Lieut., May 1918; Capt., April 1919; member of French escadrille Spad 19; served on sectors, Belfort, Vogus Mt., St. Quinton, Montdidier, Noyon, Chateau Thierry, Second Marne, St. Mihiel, Rethel, and North of Meuse-Argonne.

War Honors: Croix de Guerre (French).

Member: American Legion, Aero Club of France.

Present Occupation: Aviator, passenger carrying and exhibition.

Address: Springfield, Vt.; home, 28 Henry St., Bellows Falls, Vt.

Edward Andrus Terhune, Jr.

TERHUNE, EDWARD ANDRUS, JR., Commercial Aviator; born, Dorchester, Mass., June 9, 1895; son of E. A. Terhune, Sr. and Emma G. (Haven) Terhune; married Gladys Thompson, March 29, 1920.

Educated: Dorchester High School; B.S. in Structural Engineering 1917, Tufts College.

Professional: Organized one of the first commercial aviation companies in country; operated first aerial taxi and express in N. E. and first to fly a commercial plane up the Connecticut Valley. Treas. and General Manager of The Eastern Aircraft Corp.

Aeronautical Activities: Naval Aviation, M.I.T. Ground School 1918; trained at Key West, Fla., Miami, Moutchic, France; Calais, France; Northern Bombing Squadron, Malpensa, Italy, Oct. 1918-Jan. 1919 with Italian Army (Italian Flying Brevet).

Flying Rating: Ensign (qualified pilot).

War Service: As above.

Member: Aero Club of America, Aero Club of Massachusetts, Federation Aeronautique Internationale.

Present Occupation: Treasurer and General Manager, The Eastern Aircraft Corp.

Address: 1340 First St., S. Boston, Mass.; home, 31 Davis St., Wollaston, Mass.

Thomas Chenault McCown

McCOWN, THOMAS CHENAULT, Agriculturist; born, Richmond, Ky., Feb. 11, 1899; son of Albert Kirk McCown and Anna (Chenault) McCown; married, Marie Louise Kellogg, Jan. 31, 1920.

Educated: Private Prep. School, Richmond, Ky.; B.S. 1917, University of Kentucky.

Professional: Agriculturist.

Aeronautical Activities: Machinist Mate Aviation, Oct. 1917 to Jan. 1918, Pensacola, Fla. Ground School as Chief Quarter Master, Feb. 1 to April 15, 1918; elementary flying, April to July 1918; advanced flight and ground training instructor in bombing and F-boat flying, Aug. and Sept. 1918; submarine patrol and mine search pilot, pilot mail plane between Hampton Roads, Va. and Washington, D. C., Oct. 1918 to Feb. 1919.

Flying Rating: Ensign U. S. N. R. F., Sept. 1918.

War Service: Naval Aviation Patrol and mine search in hostile submarine zones off Atlantic Coast.

Present Occupation: Agriculturist.

Address: Ford Pike, Richmond, Ky.

Columbus Delano Ames

AMES, COLUMBUS DELANO, Sales Executive; born, Baltimore, Md., Oct. 5, 1899; son of Delano Ames and Adeline (Gibbs) Ames; married, Carolyn H. McCay, Jan. 17, 1920.

Educated: Cheshire School, Cheshire, Conn. A.B. 1914, Williams College; Post Graduate work Johns Hopkins University.

Professional: Attache, American Embassy, Rome, Italy, 1915-1919; Manager, Foreign Affairs News Service, Washington, 1919-1920; Manager, Green, Lucas, Gantz, and French, Baltimore, Md., 1921.

Aeronautical Activities: Aerial Gunnery School, Cazaux, France, Sept.-Oct. 1918; gunnery school, St. Jean de Monts; bombing school, Clermont-Farrand, France; 163rd Aero Squadron, 2nd Day Bombardment Group, A.E.F.

Flying Rating: Day Bombardment Observer.

War Service: Same as above; 19 months in A.E.F.

Member: St. Anthony Club, New York; Baltimore Club, Baltimore Country Club, Baltimore Athletic Club.

Present Occupation: Sales Executive.

Address: 1312 Fidelity Bldg.; home, Homeward Apts., Baltimore, Md.

William Ormond Butler

BUTLER, WILLIAM ORMOND, Captain, Air Service; born, Marshall, Va., Sept. 29, 1895; son of Ormond Butler and Mary (Hume) Butler; married Helen B. Daniell, April 29, 1917.

Educated: Grammar and high schools, Parkersburg, W. Va., Wallsville and Marietta, Ohio; 1917, U. S. Military Academy.

Aeronautical Activities: Aerial Observers' course, France, July to Oct. 1917; Aerial Observer, 1st Aero Squadron, Amanty, France; 91st French Balloon Company (Observer), Jan. to March 1918; C. O. and Observer, 2nd American Balloon Company, March to June 1918; in charge instruction, U. S. A. Balloon School, Lee Hall, Va., July 1918 to Oct. 1919; Airship School, Langley Field, Jan. 1921 to date.

Flying Rating: Balloon Observer, at present qualifying as Free Balloon Pilot and Airship Pilot.

War Service: 9th F. A., June 1917 to Nov. 1917; Balloon Section at Front, Jan. to June 1918; balloon instructor in U. S. to end of war.

War Honors: Croix de Guerre, May 29, 1918.

Present Occupation: Officer, U. S. Air Service.

Address: Langley Field, Va.; home, U. S. E. Repair Depot, Marietta, Ohio.

James Morgan Corbett

CORBETT, JAMES MORGAN, Commercial Aviator; born, Somerville, Mass., Sept. 15, 1897; son of Martin Corbett and Della (Renaa) Corbett.

Educated: Chas. G. Pope's School, Somerville, English High School; illness prevented continuation of studies; tutored for examinations for M.I.T.

Aeronautical Activities: Served as flying instructor at various naval stations, Nov. 1919 to March 1920; commercial field as president of North and South American Aircraft Corp., March to Dec. 1920; vice-president and general manager of Hylo Aeronautical Corp.; at present, vice-president and treasurer of Aero Corps of Massachusetts.

Flying Rating: Ensign, U. S. Naval Aviation; F.A.I. Hydroaeroplane Pilot Certificate No. 124.

Member: Aero Club of America, Aero Club of Massachusetts.

Present Occupation: Vice President and General Manager, Aero Corp of Massachusetts.

Address: 451 Fremont Bldg., Boston, Mass.; home, 95 Central Square, Somerville, Mass.

Roy Gillman Miller

MILLER, ROY GILLMAN, Aeronautical Engineer; born, Peoria, Ill., June 24, 1890; son of Maj. Charles Dunn Miller and Mary (Murdock) Miller; married, Muriel MacGregor, Sept. 8, 1919.

Educated: Public schools of Newark, Ohio; B.S. 1910, Case School of Applied Science.

Professional: Packard Motor Car Co., Detroit, Mich., 1910-1917.

Aeronautical Activities: Aviation Section, Signal Corps, June 1917; Flying Officer, Jan. 1918 to Jan. 1919; student in post-graduate course in Aeronautical Engineering, M.I.T., May to Sept. 1919; instructor in post-graduate course in Aeronautical Engineering, M.I.T., Oct. 1919 to Jan. 1919; member of Technical Staff, National Advisory Committee for Aeronautics, Langley Field, Sept. 1919 to Feb. 1921; Aeronautical Engineer with Naval Aircraft Factory, Philadelphia, Pa., Feb. 1921 to date.

Flying Rating: Reserve Military Aviator, Jan. 1919.

War Service: Army, May 1917 to Jan. 1919.

Member: Society of Automotive Engineers.

Present Occupation: Aeronautical Engineer.

Address: Naval Aircraft Factory, Philadelphia, Pa.; home, 225 Pennsylvania Road, Brookline, N. J.

New French Commercial Airplanes

The French aircraft industry recently completed two types of commercial airplanes which were specially designed for purposes of public transport These are the Spad-33 six-seater and the Potez-IX five seater. Both machines are single engined tractor biplanes, the Spad being fitted with a 250 hp Salmson 9-cyl radial water-cooled engine, while the Potez is equipped with a 370 hp Lorraine-Dietrich 12-cyl V type water-cooled engine.

The Spad-33 6-Seater

Of the two machines the Spad-33, which was built by Bleriot-Aeronautique to the designs of M Herbemont, has by far the lesser parasite resistance. The general lines of this airplane are reminiscent of the Spad racing machines. The fuselage is a perfect streamline, into which the Salmson engine blends very nicely, while the interplane truss is composed of two I struts with single flying and landing wires, and two drift wires. The cabane consists of two inverted U struts inclined outward, which position allows the pilot a large field of vision forward As on all the recent Spad products, ailerons are fitted to the lower wings only and the aileron control is internal.

The fuel supply is stored in two streamlined tanks which are mounted on the wings. The engine is thus fed by gravity

The cabin, which is situated aft of the engine compartment, accommodates four passengers, while a fifth passenger may ride in the extra seat provided in the pilot's cockpit, aft of the cabin. As the cockpit can be reached from the cabin through a passage way, the passengers are enabled to interrupt the monotony of the trip by changing seats between the cabin and the cockpit. Four portholes fitted in the walls of the cabin afford the passengers a fair view of the ground. Access is had through one side door and an emergency exit is provided by a trap door which is fitted in the roof It is said that while this door is sufficiently spacious for emergencies, the vicinity of the top wings might somewhat interfere with a speedy exit.

The passengers are seated in the direction of flight and ample leg room is provided, although the rather small portholes may give the traveler the impression of his being considerably boxed in. The cabin effectively protects the passengers against oil thrown back by the engine and the faint smell of oil which may penetrate it on starting—and which causes most cases of air sickness—rapidly vanishes once the machine is in the air. The noise of the engine is sufficiently muffled that the passengers need but slightly raise the voice to keep on a conversation In flight the temperature of the cabin is said to be normal.

From the flying tests of the Spad-33 it appears that the machine is, like all Spads, highly sensitive to control, but while its reactions are vigorous, they are of short duration and consist mainly in a slight rolling Pitching is seldom experienced.

The Potez-IX 5-Seater

The Potez-IX 5-seater is built along much more conventional lines than the Spad-33, the biplane wings being braced by four pairs of interplane struts and double flying and landing wires The fuselage houses, from the nose aft, the engine, the fuel and oil tanks, the cabin, and the pilot's cockpit. The engine is cooled by two Lamblin "bomb type" radiators which are mounted in the V's of the landing gear.

The cabin is less comfortable than that of the Spad-33, although, owing to its being fitted with regular windows instead of with portholes the Potez-IX has an appearance of greater spaciousness. It also affords better vision from the cabin Although the passengers can communicate with the pilot by means of a passage way, this is much smaller than the one on the Spad, nor can the passengers move about with as much ease because a bracing tube, which is folded up for access and egress, bars the way between the front and the rear seats.

The noise of the engine is insufficiently silenced in the cabin, for conversation is possible only when the windows are shut tight, and even then it is necessary to raise the voice a good deal. The ventilation, however, is better conserved than on the Spad as the windows of the Potez can be kept open or shut as desired Unfortunately, when the windows are open, some oil from the engine finds its way into the cabin. A very comfortable trap door in the roof serves as an emergency exit

Most of the considerations which have been set forth above are taken from an article written for *L'Aéronautique* by Paul Hermant, business manager of the Franco-Roumanian Air Transport Co, for which firm the machines were built. His remarks on the desirable commercial features these airplanes embody to a greater or lesser extent therefore assume particular significance Both machines are to be placed in service on the Paris-Prague-Warsaw route of this company. They represent what is known as the 1921 program of the French Civil Aviation Service. For 1922 M Hermant suggests the creation of airplanes that will be capable of a *cruising* speed of 120 m p h and be equipped for night flying. These machines should have a multi-engined power plant and carry, beside fuel for a 600-mile flight, eight passengers, a pilot and a navigator or a radio operator M Hermant declares that for long distance flights, where the airplane has to compete with trains that operate day and night, it is indispensable to have a cruising speed of 120 m.p h., at any rate so long as night flying is not organized

Specifications

Following are the specifications of the Spad-33 and the Potez-IX airplanes:

Span maximum	38 ft. 4 in	46 ft. 6 in
Height, overall	10 ft 5 in	10 ft. 7 in
Length, overall	30 ft. 6 in	31 ft 4 in
Wing area		473 sq ft
Gross weight	(*)	4136 lb
Useful load	(*)	1600 lb
Commercial load	1452 lb	824 lb
Passenger seats	5	4
Pilot seats	1	1
Horsepower	250	370
Maximum speed	110 m p.h	120 m p.h.
Cruising speed	87 m p.h.	110 m p h.
Cruising range	6½ hr	5 hr

* The Spad-33 was originally designed as an 8-seater and was to be fitted with the new 300 hp Salmson engine Its gross weight was to be 4186 lb, and its useful load 2300 lb which figure comprises the weight of a pilot, seven passengers, 220 lb of baggage and fuel and oil of 6 hr The gross weight and the useful load of the Spad 33 as modified is not known

An Interesting Hydro-Glider

Loughead Hydro-Glider Fitted with a 6-Cyl. Hall-Scott Engine which Develops a Speed of 60 m.p.h on the Water
Photo International

Commercial Aviation in Australia

By R. A. Hendy, late A.I.F:

The aeronautical era in the history of Australia cannot be said to have really commenced until 1919 Certainly machines were to be seen out here prior to that year, but they were few, and either owned by the military or the couple of private owners A few months after the armistice saw the registration of various companies with more or less identical objects, that is, the development of aerial transit and transport.

The geographical situation of the Australian continent is such that the climatic conditions are ideal for flying. In addition we have unlimited space for the erection of hangar accommodation, etc. It is unfortunate that the companies in existence have not got much further ahead of where they started Practically all commenced by carrying passengers for short flights, and there they still are. However, hope is still held out for the establishment of aerial mail and passenger services.

There are at present in Australia some fifty or sixty companies or persons engaged independently in aviation. The first aeronautical company to be registered was Aerial Services Ltd., Sydney, N S W, registration being effected in 1919, with a capital of £10,000

The largest company is Australasian Aerial Transport Ltd, Melbourne, Vic, which has a capital of £700,000 This company has not yet commenced flying operations, but has spent a very large amount in survey work and the preparation of maps of prospective air routes. It is the intention of the company to operate large machines at an early date, when regular interstate aerial services will be established

The second company to be registered, Aerial Co Ltd, has not done much flying other than the carriage of a few passengers. Their fleet consists of two D.H 6 biplanes, a Short sporting seaplane, two Curtiss "Seagull" flying boats, and a twin-engined Short flying boat (type F 5) The latter machine is fitted with two 375 hp Rolls-Royce "Eagle" VIII engines, and is capable of carrying ten persons. It will be used for interstate service

The Larkin-Sopwith Co are agents for the Sopwith Aviation Co, England, and are naturally using machines of Sopwith manufacture. These consist of "Gnu", "Dove", "Pup", and "Transport" types The company has carried several thousands of passengers to date.

The most energetic company appears to be the Australian Aircraft and Engineering Co Ltd. (capital £50,000). This company acts as agents for Messrs. A V Roe & Co, England, and are using machines of the 504K type. They have a fleet of twenty-two machines. Numerous long tours, ranging from 5000 to 25,000 miles, throughout New South Wales and Queensland have been successfully completed. To date over 6000 passengers have been carried and over 100,000 miles traversed without accident The company has two fine airdromes at Mascot and Manly, about three and five miles respectively, from the heart of the city of Sydney.

The first aerial mail was carried by Pilot Frank L. Roberts of this company He left Lismore, N S W, on June 26, 1920, carrying mails for all parts of the Commonwealth The trip to Tenterfield (80 miles) was negotiated in one hour. The carriage of these letters for only such a short distance meant a saving of between five and six hours. Although a success, the Postmaster General's Department has not felt disposed to give sanction for a repetition of the flight.

The Australian altitude record, for a machine carrying a pilot and three passengers, is held by Captain A W Vigers, M.C A.F.C. On June 25, 1920, flying a Sopwith "Gnu", fitted with a 230 hp. Bentley engine, he attained the altitude of 15,200 feet. Capt. Vigers is a member of the Larkin-Sopwith Co

Western Australia has but one commercial aviator, Major Norman Brearley, D.S.O., D.F.C., M.C, late R.A.F. He has been engaged conducting passenger flights for the past eighteen months and has not yet had the slightest accident. Tours have been conducted which embrace nearly all his State.

Probably the most important flight accomplished in Australia to this date is the trans-continental trip by C J de Garis. With Lieut Briggs (pilot) and Sgt. Howard (mechanic) Mr de Garis left Melbourne on November 30, and arrived at Adelaide in 4 hrs. 25 min. Perth, W A., was reached at 1 p m on December 2.

It is perhaps interesting to note the times recorded for the various stages of the trip, which embodied three capital cities.

Melbourne — Adelaide	4 hr. 25 min.
Adelaide — Wirraminna	2 " 45 "
Wirraminna — Cook	3 "
Cook — Naretha	3 "
Naretha — Southern Cross	3 " 45 "
South Cross — Perth	2 " 15 "

The total length of the trip was 2,169 miles, the actual flying time being nineteen hours. The average speed was in the vicinity of 120 m p h 1,105 miles were covered in one day of 8¾ hrs. flying, which is an exceptional performance for cross-country flying This was the first occasion three capital cities had been visited in one day

Aviation Ltd, Shaw Ross Engineering & Aviation Co., Aeroflights Co., Harry J Butler & Kauper Aviation Co Ltd., and many others have all been operating with good measure of success. Passengers, whose ages range from 2½ to 83, and weigh anything up to 21 stone, have been carried.

It is understood that over 35,000 passengers have been carried to date and over 000,000 miles traversed.

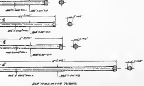
The sporting side of aviation has not been overlooked. Three aerial meetings have been held so far, two in Melbourne, and one in Sydney. The principal event in each case was, of course, the Derby, but there were also landing, stunting and climbing competitions, parachute descents and short races.

Although Australia is a young country, much is to be expected of it in the future It has the climate, space, and material and above all, a good war record and name.

Radiator Tubes

The accompanying illustration shows the radiator tubes for aircraft made by the United States Cartridge Co., which the Army Air Service is using exclusively

These tubes are 268 in. in diameter and are cut to various lengths, the volume of the aircraft business being such as to warrant this standardization. However the company is prepared to make special sizes whenever necessary, and this is being taken advantage of by many aircraft manufacturers.



Standard Radiator Tubes Manufactured by the U. S. Cartridge Co.

Airdrome Notes

Woodland, Calif.

The Yolo Fliers' Club recently conducted a successful series of races at its airdrome four miles from this town. Twenty-eight machines assembled for the program. Among the types represented were the Lepere, Friesley Falcon, Fokker, Jacuzzi, Balilla, Bristol, Curtiss, Martin, Ansaldo and Junkers.

The public showed an encouraging interest in the meeting as is evidenced by the fact that 672 passengers were carried by the machines provided for that purpose.

Scranton, Pa

The airdrome at this city has been abandoned and is unfit for use.

Oceanside, L. I., N. Y.

The New York School of Aeronautics has opened an airdrome at Oceanside, L. I., four miles north of Long Beach. The field is T-shaped, length about 1,600 ft. and width 800 ft., but landings should be made as nearly N. to S. as possible. The field can easily be picked out, being the first field on solid land following the road from Long Beach northward, on the western side of the road and between it and the railroad. Fuel and supplies can be obtained in the neighborhood, and a refreshment stand and rest rooms are being erected.

The New York School of Aeronautics will operate several machines on this airdrome during the summer, and extend a welcome to all visiting aviators.

Cleveland, Ohio

The Glenn L. Martin Field is located on the New York, Chicago & St. Louis Railway, 9½ miles N.E. of the main entrance to Cleveland Harbor (Cuyahoga River) and 1 mile S. of Euclid Beach Amusement Park in (approx.) Lat. 41 deg. 34 min. N., Long. 81 deg. 33 min. W. The field is L-shaped, extending 1,500 ft. N.W. and S.E. and 1,900 ft. N.E. and S.W., prevailing winds W., weather conditions and wind direction reported upon request. Factory facilities and service are available. Address, 16800 St. Clair Avenue, Cleveland, Ohio.

Cincinnati, Ohio

The field of the Cincinnati Aircraft Co. is temporarily closed. Notice will be given when it is reopened.

Seymour, Ind.

An airdrome of 200 acres, part now under cultivation, has been opened by the Western Airline Co. at Seymour, Ind., and is open to all pilots. The present field will accommodate machines of any landing speed and has the following facilities: Factory and repairs adjoining; auto service, telegraph, telephone, electricity, city water, paved road to edge of city, seven minutes walk to center of city.

Indianapolis, Ind.

Speedway Aviation Repair Depot at Indianapolis has been abandoned by the Air Service and is no longer fit for use.

Fort Benjamin Harrison, Ind.

The landing field at this place is 100 acres in area and in good condition.

Charlevoix, Mich.

A new airdrome is reported at this place about one-half mile S.W. of Round Lake on the N. side of Carpenter Avenue and the E. side of State Road. The field is L-shaped and extends N.W. of a maple and beech grove. The Rose-swift Airplane Co. will operate from this airdrome during the summer.

Davenport, Iowa

The Davenport Automotive School is in active operation at Wallace Field.

Detroit, Mich.

The Packard Co. makes it known that the recent fire at their establishment did not in any way hamper airdrome facilities. Some old test sheds were destroyed but the airdrome equipment is still intact and at the service of machines landing there.

St. Joseph, Mo.

The Aviation committee of the Commerce Club is considering several sites for the location of a municipal airdrome the need of which is shown by the fact that the Nebraska Aircraft Corporation, at present using a field at 36th St. and Mitchell St. for their work, has declared its intention of changing location unless more suitable accommodations can be found.

Bristol, Va.

A committee of business men are making efforts toward the establishment of a municipal airdrome here.

Duluth, Minn.

A forty-acre tract between Side and Sturgeon lakes has been purchased by the Range Aero Co. for the location of an airdrome at Swandale.

Moundsville, W. Va.

The North American Aerial Transportation Co., R. P. Wentworth, president, has established headquarters at Langin Field here, and will maintain a service to and from Washington.

Minneapolis, Minn.

A recent fire at the plant of the Curtiss Northwestern Airplane Co. did damage estimated at $125,000.

Tampa, Fla.

The Tampa-St. Petersburg Air Line conducted by A. Flavell is operating with headquarters in this city.

Fort Bridger, Wyo.

The Commercial Club of this city has established an airdrome for the Air Mail Service. The airdrome is known as Fort Bridger Landing Field and lies E. and W.—the direction of the prevailing winds. It is 1200 ft. long and 300 ft. wide, and is marked in the center by a large white cross. The soil is of gravel and loam formation which drains well. The field is one mile N. of the city, 300 yd. from the Lincoln Highway, and free to approach from all sides.

The Cheyenne-Salt Lake route of the Air Mail uses the airdrome which is open to all pilots.

Hasbrouck Heights, N. J.

The field immediately adjoins the factory of the Wittemann Aircraft Co. and has facilities for both land and water machines. The main runway for land machines is a level and smooth strip running 2,500 ft. N. and S. by 175 ft. in width. There is also an E. and W. runway 2,000 ft. in length with a usable addition of about 1,000 ft. The E. and W. runway varies from 300 to 400 ft. in width. Outside of these runways the field is being extended and improved by filling in old drainage ditches.

Yorktown, Va.

The Atlantic Fleet Torpedo Plane Squadron is now operating at the naval air station at Yorktown, Va. The field lies on the southern bank of the York River at the mouth of Felgate Creek, about 3 miles W. of Yorktown. The field is only moderately smooth and landings should be made at the slowest speed possible. Fuel and oil are obtainable and telegraphic communication has been established. The field can be identified by two large kite balloon hangars at the S.W. corner. Landings should not be attempted W. of a N. and S. line through the E. hangar.

Bloomington, Ill.

The Sheldon Air Lane, under the direction of H. B. Snow, owner and founder, is carrying passengers at Forman Field.

Staunton, Va.

Staunton's municipal airdrome is now open to pilots. Information as to facilities for repair and equipment is not available.

National Guard Aero Squadrons

A considerable amount of interest is being shown in the organization of aero squadrons among the National Guard. For the most part of this work is being done by the various states with direct assistance from the War Department. The idea underlying the formation of National Guard aero squadrons is to use up obsolete types of machines while creating a reserve of pilots, observers and mechanics which can be called on to work in conjunction with the Army Air Service.

Ohio is one of the first states to be assigned an aero squadron, the 112th, with headquarters at Columbus. Tentative organization of this squadron was recently effected at the Columbus Automobile Club when a large enrollment was secured from the Columbus Aero Club. As soon as the organization is completed it will be submitted to the adjutant general for approval after which the unit will be mustered into service.

The Maryland State Guard Air Service recently reached its full commissioned strength of 24 officers.

The First Minnesota Observation Squadron has under construction three hangars at the Twin City municipal airdrome. Hangars for the Oregon National Guard Aero Squadron are under construction at Vancouver. At a recent meeting of fifty ex-army aviators plans for the establishment of the squadron were laid out. These provide for a personnel of 24 officers and 90 enlisted men, and equipment consisting of 9 airplanes, 20 motor trucks, 36 machine guns, three anti-aircraft guns, and the necessary accessories.

The New Jersey National Guard is planning to establish an Aero Squadron with headquarters at Sea Girt.

The Massachusetts National Guard expects to have its First Aero Squadron in operation on July 1, the State Legislature having appropriated a sum of $2,000 for the maintenance of $50,000 worth of Air Service equipment stored at Framingham, Mass., which the Army promised to transfer to the State militia. The passage of this measure came chiefly through the efforts of Major Leonard H. Drennan, chief of the Air Service in the First Corps Area, and of the Archie Club, an organization comprising former Army pilots who saw actual service at the front.

The squadron will consist of nine airplanes, 25 officers and 94 enlisted men. The equipment which the Army is turning over to the squadron comprises, in addition to a hangar, workshops, etc., and the Framingham airdrome, five airplanes, two of which are DH-4's and three are Curtiss JN's.

The Birmingham Flying Club has been instrumental in organizing a National Guard Aero Squadron in Alabama.

Two hangars, now at Park Field, Memphis, will shortly be transferred to Birmingham to house the equipment of the squadron. A balloon company will also be established in addition to the Aero Squadron.

A campaign is under way in Nashville, Tenn., to secure funds by subscription for the establishment of an airdrome as headquarters of the National Guard aero squadron. The federal government is assisting in the matter of equipment and maintenance.

Aviation in Haiti

Aside from making a photographic map of the entire coastline of the island of Haiti for the coast and geodetic survey, the United States Marine corps aviation service is engaged in scheduled mail carrying in Haiti and Santo Domingo, and regular mail trips are now being made from Santo Domingo City, D. R., to Santiago and San Pedro de Macoris, D. R.

The roads in Haiti and Santo Domingo, across country and among hills, are really nothing but trails, and, while it takes several days to transport mails by old methods, it is a matter of only a few hours to carry the mails by airplane.

Navy and marine corps officers and officials of the two republics find it more convenient to travel by airplane than by the train or automobile service over the country roads. Consequently, regular inspection trips and officials trips are made from city to city in Santo Domingo and Haiti by airplane.

New Seaplane Tender

It is reported that the U.S.S. Wright, so named in memory of the late Wilbur Wright, the new seaplane tender for the Navy, will be placed in commission in August. She will take the place of either the Aroostook or the Shawmut, the present seaplane tenders now with the Pacific and Atlantic Fleets.

Arrangements were made with the U. S. Shipping Board late in 1919 for the Navy Department to take over one of the Emergency Fleet Corporation's type B ships, and to convert the vessel into an aircraft tender for kite balloons and seaplanes.

The conversion work is now being done by the Tietjen and Lang Dry Dock Co., and includes alterations necessary to fit the vessel for sea service. Provision is made for the stowage of six kite balloons, the inflation and housing of them aft in a balloon well, the necessary hydrogen generating plant for this inflation, for hydrogen stowage, and for repair plants.

The vessel is being arranged for flying operations of kite balloons, and as a tender for seaplanes.

Quarters are arranged to accommodate the ship's personnel as well as that assigned to the care and operation of the kite balloons and seaplanes. Berthing and messing accommodations are provided for the captain, one detachment commander, 28 wardroom officers, 20 junior officers, 12 warrant officers, 60 chief petty officers and 450 men.

An aerological laboratory and pigeon coop are provided; also a photographic laboratory, together with dark room, developing room, and printing apparatus. A hydrogen generator, constructed to use salt water for cooling, hydrogen compressors, hydrogen flasks, an air blower for the kite balloons, and two balloon winches will be installed.

The repair facilities consist of the following: wire assembly shop, tool issuing room, blacksmith, foundry sheet metal and coppersmith shop, carpenter and pattern shop, machine shop and motor erecting shop, electrical work shop, fabric and dope shop. Two balloon winches are fitted.

The battery will consist of 4-5 in. 51 calibre guns, two forward and two aft, also, two machine guns.

The principal dimensions, etc. of the U.S.S. Wright are as follows:

Length over all	448 ft.
Length between perpendiculars	448 ft.
Breadth molded	58 ft.
Draft	31 ft.
Displacement (normal)	14,240 tons
Speed (about)	15 knots

Second Ansaldo Cabin Cruiser Arrives

Aero Import Co. of New York recently received the second Ansaldo 6-seater cabin cruiser to arrive in this country. The ship has now been forwarded by express to Juarez, Mexico, consigned to George Puflea the American pilot who some time ago completed a remarkable flight from Lincoln, Nebraska, to Mexico City in a Lincoln Standard machine.

As soon as the ship reaches Mexico, a non stop flight will be attempted from Chihuahua to Mexico City, an airline distance of 1087 miles.

The all around performance and reliability of these ships was established early in May by a splendid flight made by Ralph Diggins and passengers between New York and Chicago, which was negotiated in 7½ hours flying time, as well as by numerous flights in Italy.

Trade Note

A handsome catalogue prepared by Messrs Wm. Beardmore & Co. includes some very interesting photographs showing the enormous range and activity of this great firm. One large photograph shows the H.M.A.R.-34 in flight which was constructed by the Inchinnan Works of the Beardmore company. Other photographs illustrate the rolling mills at Parkhead, huge forgings and castings, wheels, axles and tires, 4-6 inch howitzers, super-dreadnoughts, turbines, taxi-cabs, all built by this company. Their catalogue is a survey of a wonderful engineering organization.

Jacuzzi Monoplane in Cross Country Trip

The "Berkeley," Jacuzzi Brothers cabin monoplane recently made a round trip mail test flight from Marina field, San Francisco, to Reno, Nev. Pilot Brown, Captain Caldwell, manager of the Air Mail Service in San Francisco, and Mrs. Caldwell were in the plane, which also carried some mail, 85 gallons of gasoline, baggage, and a large basket of flowers for Mrs. Jordan, wife of Col. John A. Jordan of the Air Mail Service. On the return trip the plane stopped off at Gridley.

The trip to San Francisco was through rough weather, the airplane battling with high winds for about three hours. The trip from Reno to San Francisco took about six hours, while the trip from San Francisco to Reno required only two hours twenty-two minutes and a no-stop flight. The average speed over the entire distance, including a climb to 14,000 ft. for crossing the Sierra Nevada, was 00 m.p.h. The commercial load was 400 lb.

Life Saving Raft for Aircraft

In the design of commercial airplanes there has been a regrettable lack of attention to providing means of escape from a machine damaged by a forced landing. All commercial machines should have emergency exits located so that they are least likely to be jammed in event of accidents, thus causing the passengers to be trapped.

For land machines travelling over water there is need for some apparatus which passengers can support themselves on, until rescued, after they have left the machine through the emergency exit. Recent experiments in Britain should help

AUSTIN LIFE SAVING RAFT FOR AIRCRAFT, INFLATED FOR USE

materially in meeting this requirement. The "Austin Lifefloat", designed and patented by W. J. Austin of Swansea, England, has been successfully launched from an airplane in flight.

As can be seen from the accompanying illustration, the raft is made of airtight, waterpoof material in two sections, and when inflated by means of compressed air takes the form of a large oval of circular cross section. It is so constructed that no matter how it lands in the water it is at once ready for use. The process of inflating and making the raft ready for use requires but thirty seconds.

The test proved that the apparatus will remain inflated for a period sufficient to give the users a chance of being rescued, that it is compact and easily carried, and that the automatic release is dependable. Further reports of the use of this apparatus will be awaited with interest.

Advertising by Airplane

Wide interest in Spokane, Washington, industries is being created by the industrial airplane of the State Manufacturers' Association. The machine is covered with advertisements of Spokane manufacturers and is at present being featured at all stops on its trip through eastern Washington.

National Standardization Conference

The Secretary of the American Engineering Standards Committee, Dr. P. G. Agnew, has just returned from a short trip to Europe where he attended a conference in London of the secretaries of the national standardizing bodies.

The conference, which was called by the Secretary of the British Engineering Standards Association, Mr. C. le Maistre, had for its object an interchange of experience and the furtherance of cooperation between the various national bodies in their work of industrial and engineering standardization.

It is interesting that, notwithstanding great differences in the details of procedure, the same general method of work is followed in the different countries, namely, technical decisions concerning any specific piece of work are in the hands of a working committee which is so constituted as to be broadly representative, from both the technical and the managerial points of view, of the particular branch of the national industry concerned. This method is followed whether the work is of the nature of specifications, methods of test, or dimensional standardization.

The secretaries will submit the suggestions of the conference to their respective organizations for approval. These have to do with the interchange of publications, a reciprocal arrangement for making foreign standards available to the industries of each country through the offices of the national bodies, the exchange of information as to the status of work in progress, and other methods of furthering cooperation between the national bodies.

It was the view of the conference that international cooperation in industrial standardization work should proceed along such informal lines being based primarily upon the interchange of information on active subjects of mutual interest, rather than by any attempt at the present time to form a general international standardizing body, that in cases in which formal organization should be found necessary, the organization should preferably be by subject or industry, somewhat along the lines of the International Electrotechnical Commission, but that in all cases efforts should first be made to secure results by less formal methods, and to this end it would often be desirable that in a given subject, the office of one of the national bodies most interested should, by formal agreement, perform such secretarial functions as would further international agreement in the particular subject.

Arrangements are being made for the diffusion of information on standardization and for close cooperation between the national standardizing bodies and the International Chamber of Commerce, which will give special consideration to the subject of standardization at its convention in London, having organized a committee to develop interest in the subject on the part of industrial and commercial interests. It is the policy of the International Chamber of Commerce to further the standardization movement by such means, considering only the more general aspects of the problem, and the policies to be followed, leaving the details of industrial standardization to the national bodies, who will cooperate directly with the national organization of the International Chamber of Commerce in their respective countries.

The Pathfinders

The Yellowstone Air Route will shortly dispatch an airplane along the route of the Yellowstone Trail to plan airdromes and at the same time to promote interest in aviation.

The company intends to cover the territory from the eastern boundary of Montana to Chicago. It is being assisted in this work by the Civil Affairs Division of the Army Air Service with advice as to the location and planning of airdromes. Similar work is also being done westward to the Pacific Coast.

Change of Address

On June 1 the Chicago sales offices of the New Departure Mfg. Co. were removed from 2721 So. Michigan Ave. to the Peoples Gas Bldg., 122 So. Michigan Ave.

INDEX TO ADVERTISERS

The Aircraft Service Directory

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A Corner of the Assembly Shop

DISTRIBUTORS OF THE PRODUCTS
OF THE
CURTISS AEROPLANE & MOTOR CORPORATION:

THE STATE OF ILLINOIS, Branch Sales Office of the parent corp.	Curtiss Aeroplane & Motor Corporation, 30 North Michigan Ave., Chicago, Ills.
THE STATE OF MICHIGAN, EXCEPTING THE UPPER PENINSULA	Thompson Airplane Company, 2927 Woodward Ave., Detroit, Mich.
MOST OF THE STATE OF OHIO	Floyd J. Logan, 712 Superior Ave., N. W., Cleveland, Ohio.
THE STATE OF IOWA	Curtiss Iowa Aircraft Corporation, Fort Dodge, Iowa.
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THE STATES OF MINNESOTA, THE DAKOTAS, AND MONTANA	Curtiss Northwest Airplane Company, 707 Metropolitan Bank Bldg., Minneapolis, Minn.
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THE STATES OF TEXAS, OKLAHOMA, AND UNASSIGNED TERRITORIES	Curtiss Aircraft Corporation. Garden City, Long Island, N. Y. Love Field, Dallas, Texas.
ALL COUNTRIES OF SOUTH AMERICA	C. W. Webster, Curtiss Aeroplane & Motor Corporation, Garden City, Long Island, N. Y.

DEALERS

THE STATES OF MASSACHUSETTS AND RHODE ISLAND	Lynnway Aerial Transportation Company, 7 Central Square, Lynn, Mass.
PARTS OF THE CAROLINAS	H. L. Morrow Company, 540 S. Tryon St., Charlotte, N. C.
PART OF MARYLAND	Central Auto Company, Baltimore St., Followay & Market Place, Balto., Md.